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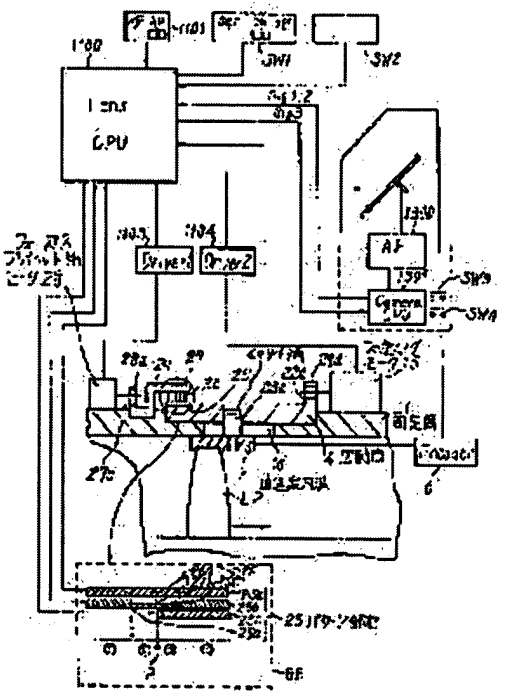
(54) LENS BARREL

(57)Abstract:

PURPOSE: To always confirm distance set in advance by a photographer and to store set distance when a photographic lens is dismounted from a camera body.

CONSTITUTION: This lens barrel is comprised in such a way that a display means (preset position display scale 29 or LCD distance display device) which displays a preset position is provided at the lens barrel, and also, the preset position can be stored by the contact of a brush 27 with a pattern member 25. Therefore, it is possible to confirm the preset position even without performing a go-home operation, the supply of a power source to hold the preset position is unnecessary.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention relates to the lens barrel which has the so-called automatic focus function which carries out focusing of the taking lens to the focal presetting location set up beforehand about a lens barrel in the camera which has an automatic-focusing adjustment.
[0002]
[Description of the Prior Art] In recent years, the camera equipped with the automatic-focusing adjustment (automatic focus) spreads, even if it does not carry out troublesome focus doubling for a beginner, a photograph can be taken easily, and it has contributed to expansion of a photography person layer.
[0003] On the other hand, since focus actuation was not able to be performed in photography by the automatic focus if a desired photographic subject does not exist in a camera station while ranging takes a certain amount of time amount, there was a case where the chance of photography was missed, to the photographic subject with which a focus must be doubled momentarily.
[0004] Then, the lens-barrel driving gear given in JP,62-232610,A is proposed. The lens-barrel driving gear of this official report memorizes the focus location by automatic focusing or hand control for the storage means beforehand, and he is trying to reproduce a focus location, the moment the desired photographic subject went into the camera station, without driving a lens-barrel to the location memorized and performing ranging actuation. For this reason, it is not necessary to perform ranging and a quick focus is attained to a desired photographic subject.
[0005]
[Problem(s) to be Solved by the Invention] However, the lens-barrel driving gear mentioned above carries out pulse count of the migration length and the direction of a migration cylinder which have the focus optical system which performs a focus, and he is trying to memorize this counted value for a storage means. For this reason, when a taking lens is made to secede from a camera body, there is a defect from which the distance memorized by the storage means and a direction will be eliminated. Although always supplying a power supply to a storage means is also considered in order to prevent such elimination, there is fault to which a battery life becomes short.
[0006] Moreover, the lens barrel which displays the preset distance conventionally needs to confirm by performing the so-called go home actuation which actually uses a focal preset feature, in order for there to be nothing and to check setting distance. For this reason, a photography person also has the defect that it cannot concentrate on photography.
[0007] This invention can always check the location which the photography person preset, and also when it secedes from a camera body from a taking lens, it aims at offering the lens barrel which can make setting distance memorize.
[0008]
[Means for Solving the Problem] A driving means to which the 1st solution means of this invention moves focus optical system, and a presetting means to preset a focal location of said focus optical system to arbitration, A detection means to detect the amount of gaps of a presetting location by said presetting means, and the current position of said focus optical system, In a lens barrel including a control means which outputs an indication signal which was detected by said detection means, and which shifts and drives said focus optical system to said presetting location based on an amount to said driving means, it has considered as a configuration including a display means to display said presetting location.
[0009] A lens maintenance cylinder which the 2nd solution means of this invention is arranged movable in the direction of an optical axis at inner circumference of a fixed cylinder removable on a main part of a camera, and said fixed cylinder, and holds said focus optical system, It is characterized by having been arranged free [rotation] at a periphery of said fixed cylinder, and having arranged a presetting position representation member rotated independently to said rotation cylinder or said fixed cylinder as said display means including a rotation cylinder which

moves said lens maintenance cylinder in the direction of an optical axis by the rotation.
[0010] As 3rd solution means of this invention, said detection means is characterized by consisting of a brush formed in said presetting position representation member, and a current carrying part which it is arranged on the circumference of said rotation cylinder, and this brush contacts.
[0011] As 4th solution means of this invention, said display means is characterized by being the digital display unit which carries out digital display of said presetting location.
[0012]
[Function] According to the 1st solution means of this invention, or the 2nd solution means, a display means to display the preset focal location is established. For this reason, the check of a presetting location of a photography person is attained easily.
[0013] According to the 3rd solution means of this invention, as a detection means to detect the amount of gaps of a presetting location and the current location of said focus optical system, while forming a brush in a presetting position representation member, the current carrying part to which this brush contacts on the circumference of a rotation cylinder is arranged. For this reason, the set-up presetting location can be held irrespective of attachment and detachment of a lens.
[0014] He is trying to use a digital display unit as a display means of a presetting location according to the 4th solution means of this invention. For this reason, a presetting location can be recognized correctly.
[0015]
[Example] Hereafter, with reference to a drawing etc., an example is explained in more detail. First, the outline of the configuration of the lens barrel by this example is explained. The lens barrel has the function of the go home mode which returns the focus of a taking lens to said focal location by which memory was carried out by actuation of the go home switch SW2, though memory of the lens location of a taking lens was carried out by actuation of the focal presetting switch SW1 and the taking lens was moved to what kind of location after that, while having the function in automatic-focusing accommodation mode (AF mode) and manual focus mode (MF mode).
[0016] The drawing of longitudinal section, drawing 2 , and drawing 3 which showed the example of the lens barrel according [drawing 1] to this invention are the plan of an example having shown the lens barrel by this invention. In drawing 1 , the fixed cylinder 1 which has bayonet pawl 1a for equipping the main part of a camera consists of outer case section 1b and container liner section 1c. While the photography optical system L1 and L3 is held, the lens maintenance cylinder 2 holding the focus optical system L2 is inserted in the inner circumference of container liner section 1c possible [sliding].
[0017] Moreover, the rotation cylinder 4 is arranged at the periphery of container liner section 1c, and container liner section 1c and the rotation cylinder 4 can be rotated freely mutually. Moreover, while 1d of rectilinear propagation guide rails is drilled in container liner section 1c, lead slot 4a is drilled by the rotation cylinder 4. Furthermore, the pin 3 was implanted in the periphery of the maintenance cylinder 2, and the pin 3 has fitted into lead slot 4a through 1d of rectilinear propagation guide rails. Therefore, a pin 3 is guided along with lead slot 4a by rotation of the rotation cylinder 4, the focus optical system L2 is moved in the direction of an optical axis through a pin 3, and focus actuation is performed.
[0018] Circumferential groove 4b is drilled in the circumference of an optical axis by the rotation cylinder 4, and while regulating migration of the direction of an optical axis of the rotation cylinder 4 by fitting in with the pin 5 by which this circumferential groove 4b was implanted in the fixed cylinder 1, rotation of the circumference of an optical axis is restricted to the fixed angle of rotation. On the other hand, the pattern section 6 of an encoder is formed in an after [the rotation cylinder 4] side edge side, and the pattern 6 of this encoder transmits to the hand of cut of the rotation cylinder 4, and CPU1100 (refer to drawing 4) inside the taking lens whose signals, such as an angle of rotation, are not illustrated by the detecting element 7 prepared in side cylinder part 1e.
[0019] Moreover, the rotation member 27 of the shape of a ring which can be rotated freely is arranged to the fixed cylinder 1, and the brush 26 is formed in the left-hand side of the rotation cylinder 4 at one at the right end face of the rotation member 27. This brush 26 contacts the pattern member 25 stuck on the before [the rotation cylinder 4] side edge side at the circumferencial direction, and detects the angle of rotation of the rotation member 27 etc.
[0020] Furthermore, on the left-hand side of the rotation member 27, the motor 28 for focal presetting has been arranged and it has geared with gear 27a by which driving shaft 28a of a motor 28 was prepared in the left end section periphery of the rotation member 27. As shown in drawing 1 and drawing 2 , the setting depth mark 29 is formed in the periphery section of the rotation member 27, and photographic subject depth mark 6b is formed in the pattern section 6 of an encoder, respectively. A photography person can space the transparent coverings 30 and 32 stopped by the opening of the fixed cylinder 1 in this setting depth mark 29 and photographic subject depth mark 6b, and can view from the outside.

[0021] The setting depth mark 29 shows the setting distance when performing focal presetting, and a photography person can lead this setting depth mark 29, and can recognize the setting distance at the time of go home actuation. Perform go home actuation one by one, it becomes unnecessary to check setting distance by this, and a photography person becomes possible [concentrating on photography]. Moreover, in order that photographic subject depth mark 6b may show the focus location which is correct actually, when go home actuation mentioned later is performed, as it is shown in drawing 3 , the distance shown in the setting depth mark 29 and photographic subject depth mark 6b serves as the same value.

[0022] The operational distance actuation ring 13 is arranged free [rotation] from the outside at the periphery of the fixed cylinder 1. The encoder pattern 16 is formed in the before [the distance actuation ring 13] side as a rotation detection means, and by contacting the detecting element 17 by which this encoder pattern 16 was fixed to the fixed cylinder 1, signals, such as a hand of cut of the distance actuation ring 13 and an angle of rotation, are detected, and it transmits to CPU1100 inside a lens barrel.

[0023] Next, the structure of the MF(manual focus)-AF (autofocus) switch clutch using a bistability mold solenoid is explained. As shown in drawing 1 , a solenoid 8 is attached in the periphery side of the rotation cylinder 4, and the shaft 8a moves in the direction of an optical axis by work of a solenoid 8. Moreover, the plate 9 is in contact with shaft 8a, and it moves in the direction of an optical axis by the attitude of shaft 8a.

[0024] On the other hand, Shafts 12a and 12b can be held by a plate 9 and the plate 10 prepared in one at the rotation cylinder 4, can be interlocked with the attitude of shaft 8a through the bending sections 9b and 9c of the plate 9 which is in contact with the pars intermedia 12c and 12d of Shafts 12a and 12b, and can move in the direction of an optical axis. Holes 4e and 4f are established in the lobes 4c and 4d of the rotation cylinder 4, and Shafts 12a and 12b have fitted into each.

[0025] Furthermore, lobe 13a of the distance actuation ring 13 is arranged in a before [lobe 4c] side, and the segment gear 14 is arranged in the after [4d of lobes] close-attendants side. It is on Shafts 12a and 12b and the diameter of said at Lobes 13a and 14a, and two or more slots 13b and 14b into which a shaft can fit are formed in the circumferencial direction.

[0026] When Shafts 12a and 12b are in a before side location, and shaft 12a It fits into hole 4e by the side of before the rotation ring 4, and hole 13b of the distance actuation ring 13 at coincidence. and the condition (un-illustrating) that shaft 12b does not fit in with hole 14b of the segment gear 14 -- moreover, when Shafts 12a and 12b are in a backside location Shaft 12b fits into hole 14b of 4f of holes on the backside [the rotation ring 4], and the segment gear 14 at coincidence, and the location of the shaft 12a is carried out so that it may be in the condition (drawing 1) that hole 13b of the distance actuation ring 13 does not fit in. And when Shafts 12a and 12b are in a before side location, the distance actuation ring 13 and the rotation ring 4 rotate in one, and when it is in a backside location, the segment gear 14 and the rotation ring 4 rotate in one.

[0027] Moreover, shaft 12a can be energized to a before side, they are energizing shaft 12b to the backside, and the contact sections 11a and 11b of the flat spring 11 prepared in the plate 9 can make Shafts 12a and 12b fit in smoothly to Holes 13b and 14b. Furthermore, since two or more hole 13b of the distance actuation ring 13 and hole 14b of the segment gear 14 are prepared, even if the rotation ring 4, the distance actuation ring 13, and the segment gear 14 have the angular-position relation of arbitration, smooth connection of the rotation ring 4, the distance actuation ring 13, and the segment gear 14 is performed immediately.

[0028] Next, a focal preset feature and a go home function are explained. Drawing 4 is the block diagram having shown the circuitry of the lens barrel of drawing 1 .

[0029] As shown in drawing 4 , the circuit of the lens barrel of drawing 1 is constituted centering on the lens CPU 1100, and the changeover switch 1101 which changes MF (manual focus) and AF (autofocus), the pattern member 25, an encoder 6, a driver 1103, and 1104 grades are connected.

[0030] An encoder 6 is an optical encoder which detects the location of the focus optical system L2 arranged in the fixed cylinder 1, and transmits a hand of cut, an angle of rotation, etc. of the rotation cylinder 4 to the lens CPU 1100 arranged inside a lens with this encoder 6.

[0031] The focusing motor 15 for moving the focus optical system L2 is attached, and driving shaft 29a of the focusing motor 15 gears with gear 22a attached in the right flank periphery of the rotation cylinder 4 in the fixed cylinder 1, makes it rotate the rotation cylinder 4, and moves the focus optical system L2 to it forward and backward.

[0032] Moreover, the rotation member 27 which can be rotated freely is formed in the left-hand side of the rotation cylinder 4 to the fixed cylinder 1. The brush 26 which contacts the pattern member 25 as mentioned above is formed in the right edge of the rotation member 27 at one. On the other hand, as shown in the portion surrounded with the dashed line of the drawing 4 Nakashita section, a brush 26 consists of three electrodes 26a, 26b, and 26c, and when these electrodes contact the pattern member 25, it detects the location of the rotation member 27. Gear 27a which gears with

driving shaft 28a of the motor 28 for focal presetting is prepared in the left end section periphery of the rotation member 27, and turning effort is transmitted to the rotation member 27 by rotation of the motor 28 for focal presetting.
[0033] the pattern member 25 -- a conductor -- Sections 25a, 25b, 25c, and 25d prepare -- having -- **** (inside of a dashed line) -- each -- a conductor -- the section is connected to CPU1100. electrode 26a of a brush 26 -- a conductor -- the location of ** always contact section 25a and excluding [electrode 26b] home-position location P order ** and ** and ** -- respectively -- a conductor -- Sections 25d and 25b are contacted. Here, the home-position location P is a criteria location at the time of performing go home actuation.
[0034] moreover, electrode 26c -- the location of ** and ** -- a conductor -- section 25c is contacted. From this, the signal according to the contact location of each electrode is transmitted to CPU1100, and computes the relative location of the rotation member 27 and the rotation cylinder 4. In addition, the sum total of the length of ** and ** and the sum total of the length of ** and ** are length required for a tumbling barrel 22 to rotate from infinity location of a taking lens to the maximum contiguity location.
[0035] Furthermore, the go home switch SW2 for performing the so-called go home which drives a lens in the focal presetting switch SW1 for performing the mode change-over switch SW1101 for in addition to this performing selection in AF mode and MF mode and focal presetting and the home-position location P is connected to the lens CPU 1100, respectively.
[0036] the focal presetting switch SW1 -- "set", "off", and "on" -- three positions by being selectable and operating it in the "set" location, respectively When the focus location of a photography person request is memorized and it is in an "off" location, even if the go home switch SW2 is operated, when go home actuation is prevented and it is in "on" location The focus of a taking lens is doubled so that it may become said memorized lens location by operating the go home switch SW2.
[0037] Although the auto return of the switch SW1 is carried out to "on" location from the "set" location, it is a slide switch set up so that an auto return might not be carried out to "on" location from an "off" location but it might always be located in any of "on" location and an "off" location they are. The go home switch SW2 is a switch of carbon button format, it operates in order to make the lens location memorized when it became ON while adding actuation, and the focal presetting switch SW1 was in "on" location drive a lens, but when a finger is lifted from a carbon button and actuation is canceled, it becomes off and said actuation is stopped at the time.
[0038] Moreover, in order to carry out drive control of said motors 15 and 28, while the 1st and 2nd driver 1103 and 1104 is connected, respectively, the said encoder 6 and body side CPU 1301 is connected to the lens side CPU 1100.
[0039] Next, actuation of the above-mentioned example is explained along the flow chart of drawing 5 , drawing 6 , and drawing 7 . First, in case photography by AF mode is performed, AF mode is chosen with the mode change-over switch SW1101 (refer to drawing 4). By this, the signal of the purport which shows AF mode is outputted to CPU1100 inside a lens, the focus optical system L2 drives by the focusing motor 15 based on the amount of defocusing computed by focal detection equipment 1300, and an automatic focus is performed. The actuation in this AF mode is as follows.
[0040] If the half-push operation of release ** is interlocked with and a switch SW3 is turned on as shown in drawing 5 , the focal detection equipment 1300 in the camera side CPU 1301 will be started (step S1). The amount of defocusing is computed with starting of focal detection equipment 1300 (step S2), and the amount of drives of the focus optical system L2 calculates (step S3). Under the present circumstances, a camera CPU 1301 outputs lens driving signal sig.1 to a lens CPU 1100.
[0041] Then, the 2nd driver 1104 is started (step S4) and the focusing motor 15 starts a drive by control of this 2nd driver 1104 (step S5). Under the present circumstances, the amount of lens drives is detected by the optical encoder 6, that detecting signal is inputted into a lens CPU 1100, and it is amount signal sig.of lens drives 3. It carries out and is sent to a camera CPU 1301.
[0042] The turning effort of the focusing motor 15 is transmitted to the rotation cylinder 4 through Gears 29a and 22a. If the rotation cylinder 4 rotates, the focus optical system L2 will be moved in the direction of an optical axis by the pin 3 prepared in lead slot 4a, 1d of rectilinear propagation guide rails, and the lens maintenance cylinder 2 that fits into these.
[0043] Furthermore, it is judged whether the half-** switch SW3 turns on (step S6), if an affirmation result is obtained, it will set to a camera CPU 1301, and it is amount signal sig.of lens drives 3. The amount of defocusing is measured and it judges that it is a focus condition (step S7). When an affirmation result is obtained in step S7, it is lens drive stop signal sig.2. The drive of delivery and the focusing motor 15 is stopped on a lens CPU 1100 (step S8).
[0044] In addition, processing will be ended if step S6 is judged that the negative result SW3, i.e., a half-** switch, does not turn on.
[0045] Now, it is judged whether if the drive of the focusing motor 15 is stopped at step S8, the half-** switch SW3 is turned on again (step S9), and if an affirmation result is obtained, ON of all the ** switches SW4 and OFF will be

judged (step S10). If all the ** switches SW4 are judged to be ON, exposure actuation including shutter disconnection will be performed (step S11).
[0046] If it is judged that the negative result SW3, i.e., a half-** switch, does not turn on by step S9, processing will be ended, and if a negative result is obtained at step S10, it will return to step S9. Thereby, the focus condition over a desired photographic subject can be acquired.
[0047] Next, the actuation in MF mode is explained below. If it was in AF mode mentioned above, it was that to which the amount of lens drives calculates from the amount of defocusing, the focusing motor 15 (M2) drives based on this amount of drives, and focus actuation is finally performed. On the other hand, in MF mode, in that a lens drive is performed by the drive of the focusing motor 15, although it is the same as that of AF mode, the amount of drives is different from the case in AF mode with the point defined according to the angle of rotation (amount) of the distance actuation ring 13 shown in drawing 1 .
[0048] If it is in MF mode, MF mode is first chosen with the mode change-over switch SW1101. The signal of the purport which shows MF mode is outputted to CPU1100 inside a lens by this, and it changes into the condition that the lens drive based on the rotation of the distance actuation ring 13 is performed. And if rotation actuation of the distance actuation ring is carried out, this hand of cut and rotation will be detected by the encoder pattern 16 and the detecting element 17 (refer to drawing 1), and this signal will be transmitted to a lens CPU 1100.
[0049] A lens CPU 1100 starts the drive of the focusing motor 15 through the 2nd driver 1104 based on the transmitted signal. Under the present circumstances, looking into a finder ocular, a photography person rotates the distance actuation ring 13, and performs manual focus actuation. And when a focus condition is acquired, if rotation of the distance actuation ring 13 is suspended, the focusing motor 15 will stop and the focus optical system L2 will serve as a focus location. In addition, actuation of focal detection equipment 1300 is forbidden at the time of MF mode setting. Thus, focus doubling by MF is performed and the focus condition over a desired photographic subject can be acquired.
[0050] Next, the flow of actuation of focal presetting is explained according to the flow chart of drawing 6 . First, if the focal presetting switch SW1 is operated to the "set" location with a suitable focal distance, the focal distance at this time will be inputted into a lens CPU 1100 as a focal presetting signal. And CPU1100 outputs a driving signal to the 1st driver 1103, and starts this. (step S21) The motor 28 for focal presetting is driven (step S22).
[0051] Thereby, the brush 26 of one rotates to the rotation member 27 and this by Gears 28a and 27a. And it is judged whether the boundary (the home-position location P of drawing 4) of ** and ** which were shown in drawing 4 was arrived at by contact to a brush 26 and the pattern member 25 (step S23). If an affirmation result is obtained, the drive of the motor 28 for focal presetting will be stopped (step S24). .
[0052] In addition, when it is judged that it has not reached as a result of [negative] P (i.e., a home-position location) at step S23, repeat activation of step S23 is carried out until an affirmation result is obtained. Thus, the location of the focus optical system L2 at the focal presetting switch SW1 actuation-time turns into the home-position location P of the pattern member 25. And at the time of focal presetting, the focusing motor 15 is driven, the rotation cylinder 4 is rotated, the focus optical system L2 is moved to the home-position location P, and go home actuation is performed at it.
[0053] Here, the hand of cut and rotational speed of a brush 26 are a brush 26 (26a, 26b, 26c). Pattern member 25 (25a, 25b, 25c) When it is on field **, Encoder GE outputs a signal "1, 1, 0" to a lens CPU 1100, and it is set up so that the focus optical system L2 may be quickly moved in the direction of drawing Nakamigi, and it may rotate as much as possible at high speed. Conversely, when it is on field ** of the pattern member 25, Encoder GE outputs a signal "1, 1, 1" to a lens CPU 1100, and it is set up so that the focus optical system L2 may be moved leftward in drawing quickly, and it may rotate as much as possible at high speed.
[0054] If a brush 26 enters on field [of the pattern member 25] **, and **, Encoder GE will output a signal "1, 0, 0", or "1, 0, 1" to a lens CPU 1100, and it will be set up in this field so that it may rotate at a low speed. And if a brush 26 detects the edge of the pattern member 25 (i.e., if it detects that the signal of pattern 25c was set to "1" from "1" to "0", or "0"), CPU1100 will output a stop signal to the motor 28 for focal presetting.
[0055] Thus, the drive of a brush 26 stops in the home-position location P, and focal presetting is completed. In addition, it is [like] desirable, even when there is a command of a go home or AF actuation until focal presetting is completed to set up so that priority may be given to the interrupt level of the command signal of focal presetting over other things so that these commands may be forbidden by the lens side CPU 1100. After completion of focal presetting, the usual AF actuation is resumed and the focus optical system L2 is moved based on the focal detecting signal of focal detection equipment 1300.
[0056] If it does so, the pattern member 25 interlocked with the focus optical system L2 will move with migration of the focus optical system L2, and will change to the condition that it is not in agreement from the condition that the home-position location P of a brush 26 and the pattern member 25 was in agreement. However, since the brush 26 is

being fixed to the fixed location irrespective of migration of the rotation cylinder 4, it will not change from the setting location on the fixed cylinder 1, and the memory of the lens location of the focus optical system L2 by focal presetting actuation will be maintained. For this reason, memory can be maintained without supplying a power supply, even when a taking lens is detached and attached, and a battery life is not shortened.

[0057] Next, the flow of actuation of a go home is explained according to the flow chart of drawing 7 . If the go home switch SW2 is turned on by the method mentioned above in a suitable lens location after focal presetting is completed, a go home signal will be outputted from a lens CPU 1100. If it does so, it will shift to step S31, and if it is judged whether the focal presetting switch SW1 is in "on" location and an affirmation result is obtained, it will progress to step S32.

[0058] At step S32, a lens CPU 1100 is driving signal sig.1 under reception of a go home signal, and from a camera CPU 1301. It is controlled not to receive and the signal which starts the 2nd driver 1104 according to the location of said pattern member 25 and brush 26 is outputted (step S32). . And it progresses to step S33 and the focusing motor 15 (M2) is driven, and contrary to the time of focal presetting, a pattern 25 side begins rotation and shifts to step S34.

[0059] And in step S34, if it is judged whether the brush 26 reached the boundary (the home-position location P of drawing 4) of ** and ** and an affirmation result is obtained, it will shift to step S35 and the drive of the focusing motor 15 (M2) will be stopped. If a negative result is obtained, rotation of a motor 15 will be continued until an affirmation result is obtained. Thus, the drive of the pattern member 25 stops in the home-position location P, and go home actuation is completed.

[0060] Drawing 8 is drawing having shown the relation between the speed of the focusing motor 15, and the mutual migration length of the pattern member 25 and a brush 26. As shown in drawing 8 , rotation of a motor 15 is set up so that it may rotate at a speed comparable as the drive speed at the time of AF, when PURASHI 26 exists in field ** or ** of the pattern member 25 shown by drawing 4 .

[0061] Moreover, in field ** or **, it is set up so that it may become a low speed as much as possible, and it sets up so that overshoot S (refer to the graph of drawing 8) of a brush 26 may be converted into the depth of field of a lens and it may become sufficiently small. In drawing 8 , overshoot of a brush 26 is set to 2S because a motor 15 rotates in both directions. Drawing 8 shows the field of overshoot 2S as **.

[0062] In addition, in the above-mentioned system, while operating the go home switch SW2, the lens drive to the home-position location P is performed, after the completion of a drive continues holding a lens in the home-position location P, but if actuation of the go home switch SW2 is stopped, the go home signal inputted into the lens CPU 1100 will not be inputted. In this case, a lens CPU 1100 suspends the drive control of the focusing motor 15 based on a go home signal, receives again lens driving signal sig.1 from a camera CPU 1301, and drives the focusing motor 15 based on that signal. Consequently, before return actuation of the focus optical system L2 by the go home is completed, drive control of the taking lens by the usual AF mode is performed.

[0063] After that, again, if focal presetting SW1 is operated, a brush 26 can perform actuation mentioned above and can carry out memory of the new lens location. The actuation mentioned above is repeatable any number of times.

[0064] Drawing 9 is the flow chart having shown actuation of a go home in case the mode change-over switch SW1101 is set as MF mode, and explains the go home actuation at the time of MF mode setting along with drawing 9 hereafter.

[0065] If the go home switch SW2 is operated by the method mentioned above in a suitable lens location after focal presetting is completed, a go home signal will be outputted to the lens CPU 1100 shown in drawing 4 . When it does so, as it is shown in drawing 9 , when it is judged whether the focal presetting switch SW1 is in "on" location first (step S41) and an affirmation result is obtained, it is step S41'. It shifts. Step S41' The solenoid 8 of said MF-AF switch clutch is then operated, and driving force of a change and the focusing motor 15 (M2) is made into the condition which can be transmitted to the focus optical system L2 from MF mode at AF mode.

[0066] Next, the command signal which progresses to step S42 and starts the focusing motor 15 for the 2nd driver 1104 according to the location of said pattern member 25 and brush 26 is outputted. And it shifts to step S43, the drive of the focusing motor 15 (M2) is started, and the pattern member 25 side rotates on the contrary with the same drive as the time of AF mode at the time of focal presetting. And in step S44, if it judges whether the brush 26 reached the boundary (the home-position location P of drawing 4) of ** and ** and an affirmation result is obtained, it will progress to step S45 and the drive of the focusing motor 15 will be stopped.
 [0067] And after it shifts to step S46 from step S45 and the drive of the pattern member 25 stops in the home-position location P, it is the above-mentioned operating reverse and switching a solenoid 8 to MF mode from AF mode, and MF ring and the focus optical system L2 are interlocked. Thus, the go home in MF mode is completed. Here, the hand of cut of the pattern member 25 and a setup of rotational speed are the same as that of the case of the go home in AF mode mentioned above.

[0068] Here, while operating the go home switch SW2, a lens drive is performed to the home-position location P, after

the completion of a drive continues holding a lens in the home-position location P, but if actuation of the go home switch SW2 is stopped, the go home signal inputted into the lens CPU 1100 will not be inputted. In this case, a lens CPU 1100 suspends the drive control of the focusing motor 15 based on a go home signal, operates a solenoid 8 immediately and makes a clutch the condition in which a change and migration of the focus optical system L2 by MF ring are possible from AF mode at MF mode.

[0069] Moreover, if it restricts at the time of a go home in case the lens barrel is set as MF mode (manual focus mode) by the mode change-over switch 1101 as mentioned above, each change over with AF mode and MF mode is compulsorily performed irrespective of actuation of the mode change-over switch 1101.

[0070] After that, again, if the focal presetting switch SW1 is operated, a brush 26 can perform actuation mentioned above and can carry out memory of the new lens location. The actuation mentioned above is repeatable any number of times.

[0071] Here, after a power supply is supplied to a camera, when the focal presetting SW1 is not operated once, namely, even if it is the case where memory of the lens location is not carried out, go home actuation is performed by operating the go home SW2 that a lens should be driven to the lens location which carried out memory at the time of the last photography. Thereby, it is not necessary to always carry out the monitor of the difference of a memory location and the present lens location, and useless power consumption can be avoided.

[0072] In addition, in this example, although the pattern member and the brush were used as a positioning means of focal presetting, the positioning means by non-contact methods, such as optical methods, magnetic methods, etc., such as a photo interrupter and a transparency-type slit pattern, may be used.

[0073] Thus, according to this example, it is not necessary to do the troublesome activity which can check easily, performs go home actuation and checks setting distance with the setting depth mark 29 which established the focal presetting location of a taking lens in the periphery of the rotation member 27.

[0074] Moreover, although the setting depth mark 29 is used as a display means of a presetting location, you may make it use the LCD distance display 31 by liquid crystal (LCD) instead of the setting distance display graduation 29 and covering 30 in this example, as shown in drawing 10 . According to this, setting distance can be checked in the numeric character by which digital display was carried out, and it becomes possible to recognize setting distance correctly.

[0075]

[Effect of the Invention] Since the display means of a presetting location is formed in the lens barrel according to the lens barrel by this invention as explained in detail above, a presetting location can be checked even if it does not perform go home actuation one by one.

[0076] Moreover, while not supplying a power supply in order to hold a presetting location since he is trying to move focus optical system to a presetting location based on the amount of gaps of the brush and current carrying part which were prepared in display material when performing a go home, a presetting location can be memorized even when a lens is detached and attached.

[0077] Furthermore, since it is made to carry out digital display of the presetting location, it becomes possible to check a presetting location at a glance.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A lens barrel characterized by including a display means characterized by providing the following to display said presetting location in a lens barrel A driving means which moves focus optical system A presetting means to preset a focal location of said focus optical system to arbitration A detection means to detect the amount of gaps of a presetting location by said presetting means, and the current position of said focus optical system A control means which outputs an indication signal which was detected by said detection means, and which shifts and drives said focus optical system to said presetting location based on an amount to said driving means
[Claim 2] A fixed cylinder removable on a main part of a camera, and a lens maintenance cylinder which is arranged movable in the direction of an optical axis at inner circumference of said fixed cylinder, and holds said focus optical system, It is arranged free [rotation] at a periphery of said fixed cylinder, and a rotation cylinder which moves said lens maintenance cylinder in the direction of an optical axis by the rotation is included. As said display means A lens barrel according to claim 1 characterized by having arranged a presetting position representation member rotated independently to said rotation cylinder or said fixed cylinder.
[Claim 3] Said detection means is a lens barrel according to claim 1 or 2 characterized by consisting of a brush formed in said presetting position representation member, and a current carrying part which it is arranged on the circumference of said rotation cylinder, and this brush contacts.
[Claim 4] Said display means is a lens barrel according to claim 3 from claim 1 characterized by being the digital display unit which carries out digital display of said presetting location.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing 1 is the drawing of longitudinal section having shown the example of the lens barrel by this invention.
[Drawing 2] Drawing 2 is the plan having shown the example of the lens barrel by this invention.
[Drawing 3] Drawing 3 is the plan having shown the example of the lens barrel by this invention.
[Drawing 4] Drawing 4 is the block diagram having shown the circuitry of the lens barrel of drawing 1 .
[Drawing 5] Drawing 5 is the flow chart having shown actuation of the lens barrel by this invention.
[Drawing 6] Drawing 6 is the flow chart having shown actuation of the lens barrel by this invention.
[Drawing 7] Drawing 7 is the flow chart having shown actuation of the lens barrel by this invention.
[Drawing 8] Drawing 8 is drawing having shown the relation between the speed of a focusing motor, and the mutual migration length of a pattern member and a brush.
[Drawing 9] Drawing 9 is the flow chart having shown actuation of the go home in the case of being set as MF mode.
[Drawing 10] Drawing 10 is the drawing of longitudinal section of other examples of the lens barrel by this invention.
[Description of Notations]
1 Fixed Cylinder
2 Lens Maintenance Cylinder
3 Pin
4 Rotation Cylinder
4a Lead slot
6 Pattern Section (Encoder)
7 Detecting Element
8 Solenoid
L2 Focus optical system
15 Focusing Motor
25 Pattern Member
26 Brush
27 Rotation Member
28 Motor for Focal Presetting
29 Setting Depth Mark
30 Covering
1100 Lens CPU
1101 Mode Transfer Switch
1301 Camera CPU

[Translation done.]

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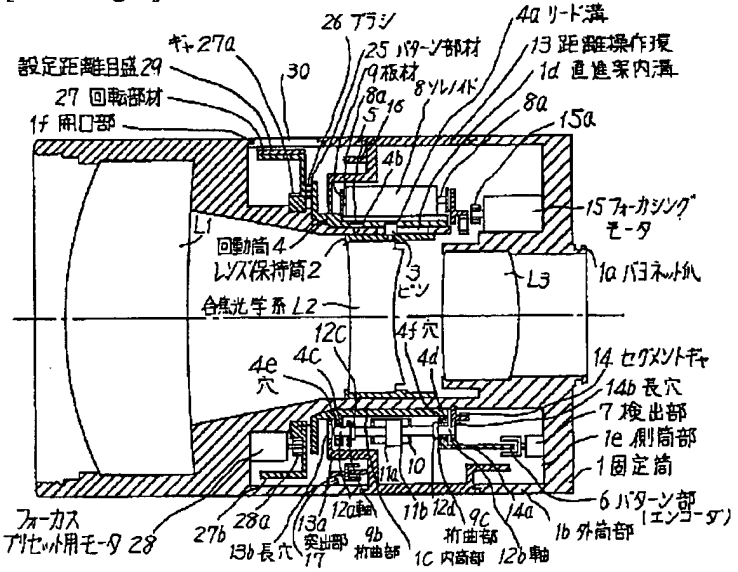
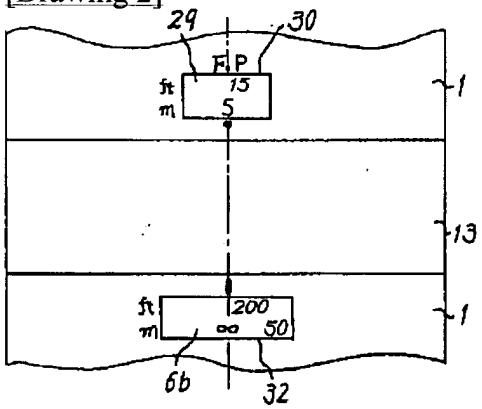
3.In the drawings, any words are not translated.

DRAWINGS

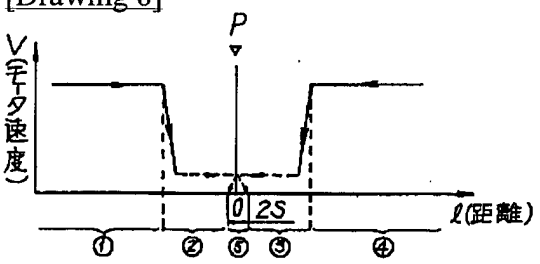
[Drawing 1]



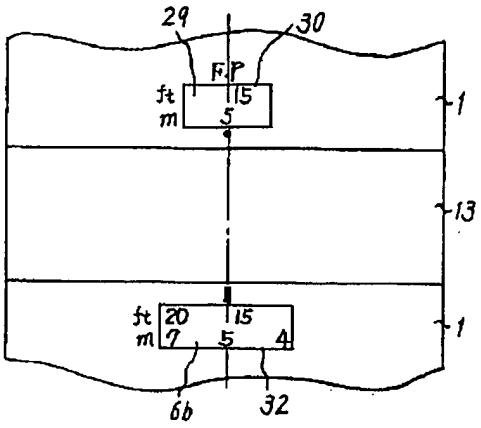
[Drawing 2]



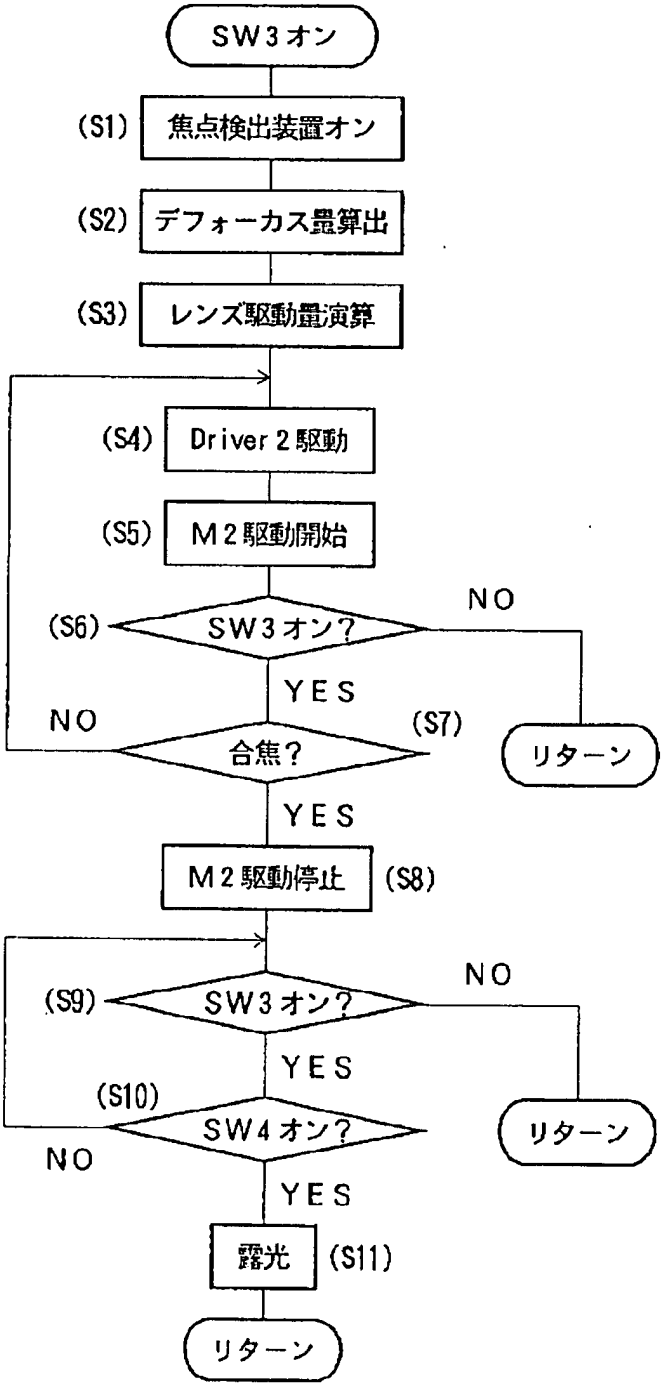
[Drawing 8]



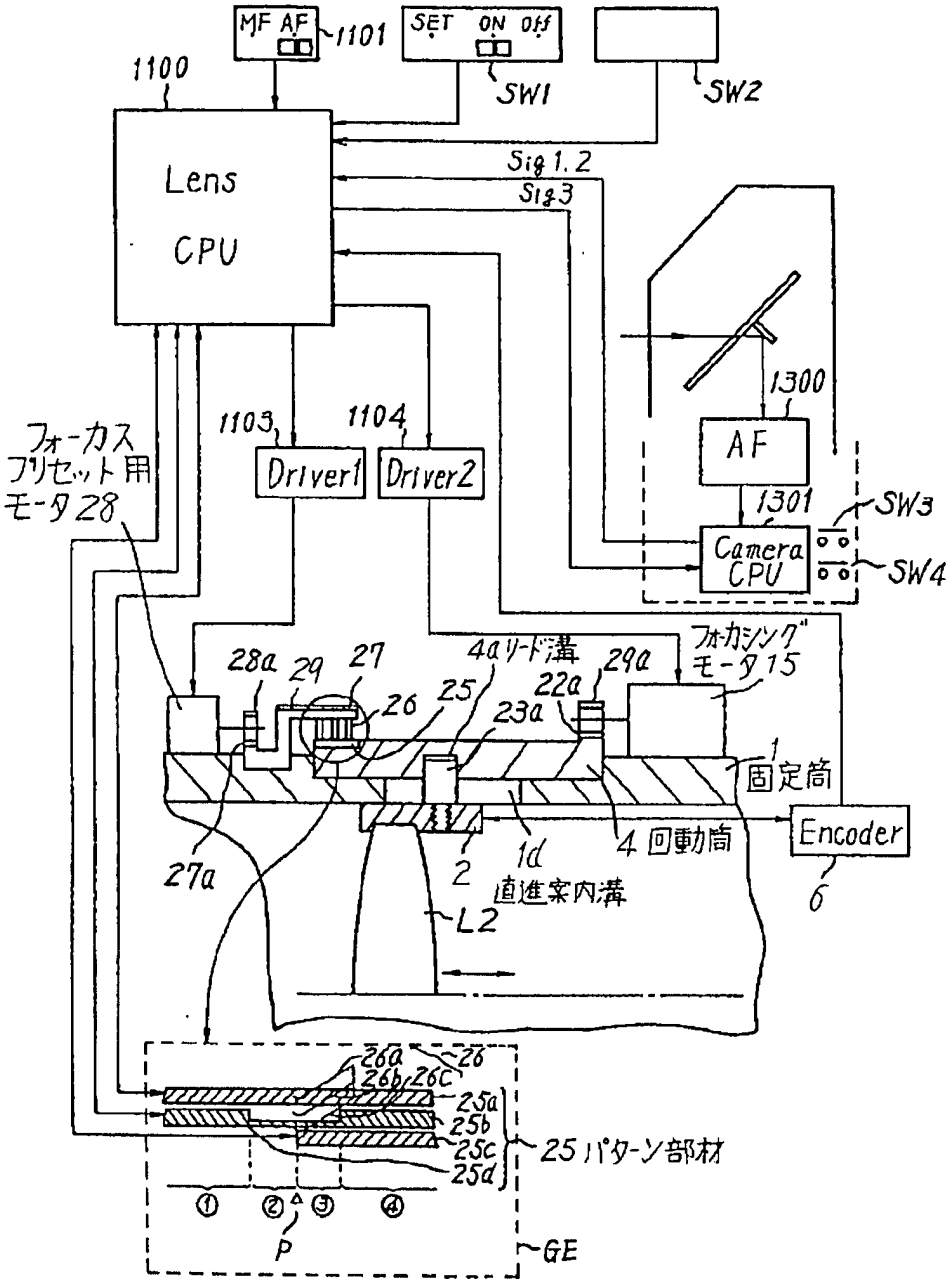
[Drawing 3]



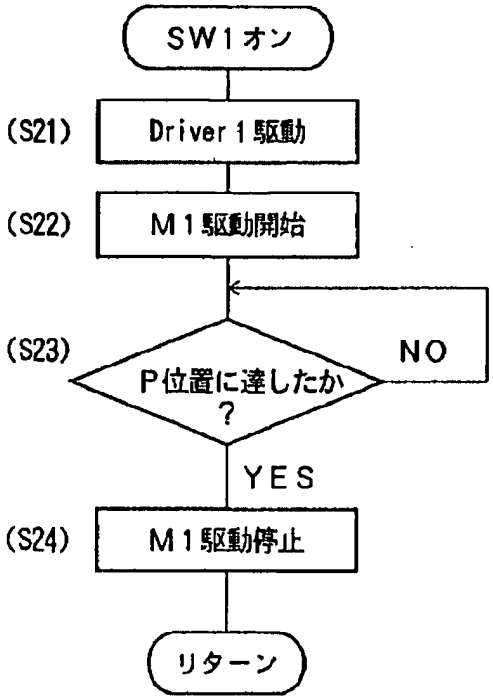
[Drawing 5]


SW3オン
(S1)
焦点検出装置オン
(S2)
デフォーカス量算出
(S3)
レンズ駆動量演算
(S4)
Driver 2 駆動
(S5)
M2駆動開始
(S6)
SW3オン?
NO
YES
NO
(S7)
合焦?
リターン
YES
M2駆動停止
(S8)
(S9)
SW3オン?
NO
YES
(S10)
SW4オン?
リターン
NO
YES
露光
(S11)
リターン

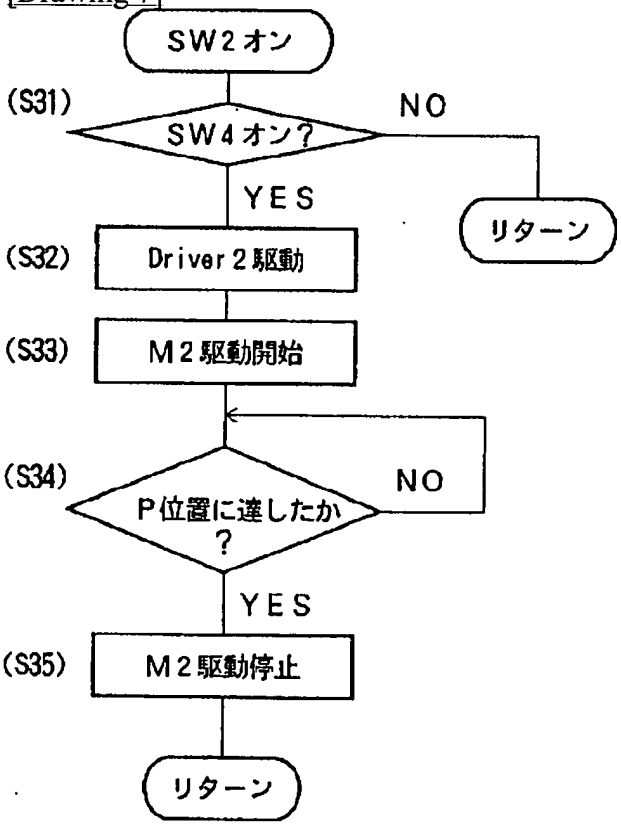
[Drawing 4]


MF AF
1101
SET ON Off
SW1
SW2
1100
Lens CPU
Sig 1.2
Sig 3
1300
AF
1301
SW3
Camera CPU
SW4
フォーカス プリセット用 モータ28
1103
1104
Driver1
Driver2
28a
29
27
26
25
4a リード溝
23a
22a
29a
フォーカシング モータ15
1
固定筒
Encoder
6
27a
2
1d
直進案内溝
4 回動筒
L2
26a
26
26b
26c
25a
25b
25c
25d
25 パターン部材
①
②
③
④
P
GE

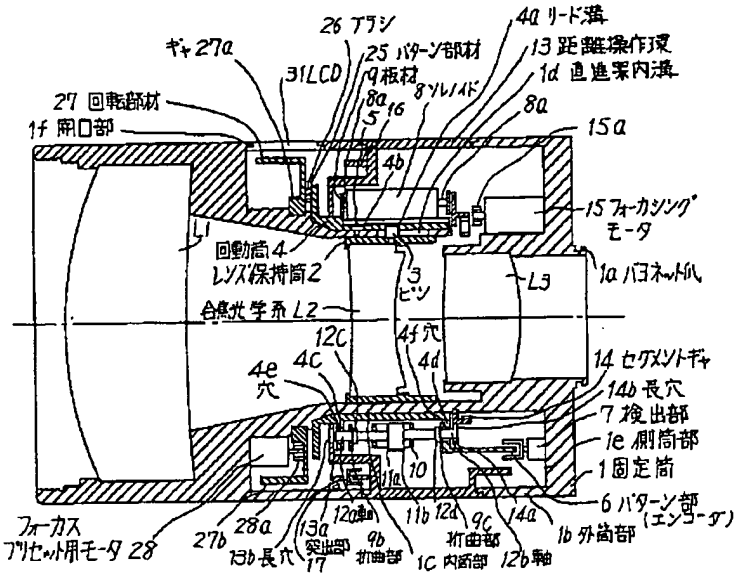
[Drawing 6]



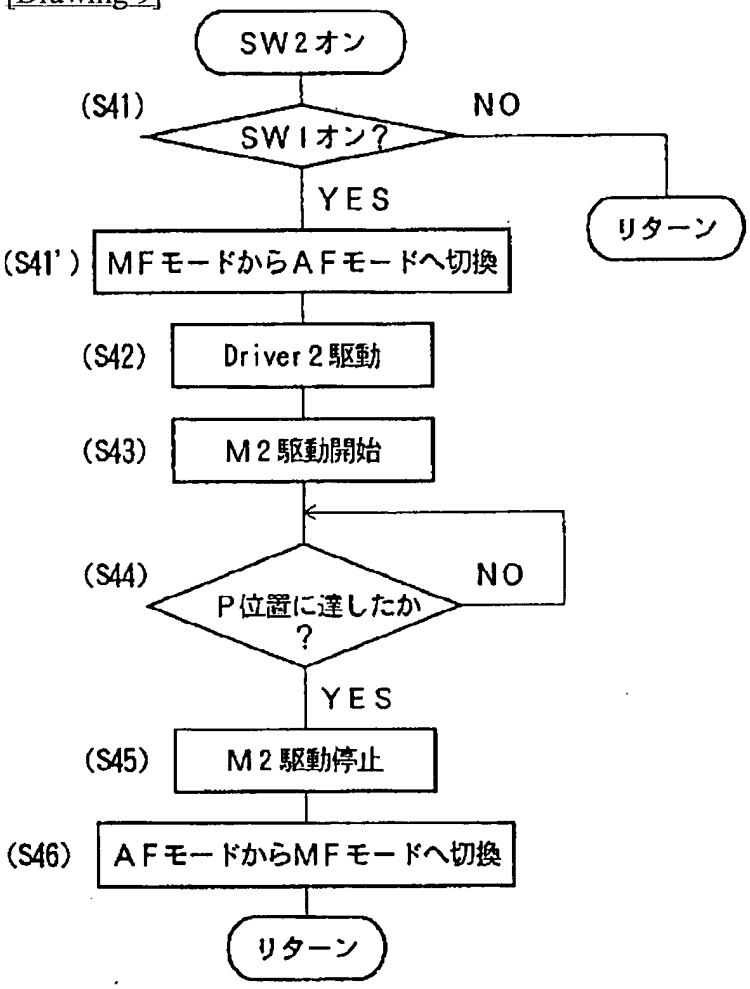
[Drawing 7]



[Drawing 10]



[Drawing 9]



[Translation done.]